

CLAIMS

1 (amended). A pipe, [of the type] comprising:

- a concrete cylinder possessing at least one annular end of determined longitudinal axis, defined by a longitudinal outside peripheral face and by a transverse front face;

- a female end ring coaxial with said end and secured thereto, the ring consisting in:

- firstly a longitudinal ferrule for securing to the cylinder, the ferrule being defined by a longitudinal inside peripheral face fitting snugly against said outside peripheral face in the immediate vicinity of said front face; and

- secondly a longitudinal skirt projecting longitudinally over said front face to engage coaxially on a male endpiece of another pipe,

wherein the ferrule is in a state of circumferential elastic tension providing sealing relative to said outside peripheral face by said inside peripheral face applying thereagainst transverse pressure which is circumferentially distributed in continuous manner.

2 (amended). A pipe according to claim 1, wherein said circumferential elastic tension is such that said inside peripheral face is fastened, at least in part, to said

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outside peripheral face by the mutual friction effect that results from said transverse pressure.

3 (amended). A pipe according to claim 2, <sup>former including</sup> wherein <sup>91</sup> it includes at least one band coaxially surrounding the ferrule <sup>5</sup> and placed in circumferential tension.

4 (amended). A pipe according to claim 1, wherein said inside peripheral face <sup>23</sup> presents at least one continuous annular sealing portion in relief <sup>29</sup> facing said outside peripheral face <sup>12</sup> in a state of elastic and/or plastic transverse compression thereagainst, formed integrally with the ferrule <sup>5</sup>.

5 (amended). A pipe according to claim 1, wherein said outside peripheral face <sup>12</sup> and said inside peripheral face <sup>23</sup> flare in the longitudinal direction going away from said front face <sup>11</sup> and relative to the transition between the ferrule <sup>5</sup> and the skirt <sup>6</sup> <sup>22</sup>.

6 (amended). A pipe according to claim 4 wherein said continuous annular portion in relief <sup>29</sup> is in the form of a rib <sup>29</sup> and there is only one of them.

7 (amended). A pipe according to claim 1, wherein said inside peripheral face <sup>23</sup> is fastened to said outside peripheral face <sup>12</sup> by annular adhesive <sup>52</sup> between them.

8 (amended). A pipe according to claim 1, <sup>f.i.</sup> wherein <sup>5</sup> it includes at least one continuous sealing ring of plastic

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material interposed between said inside peripheral face and  
said outside peripheral face.<sup>12</sup>

9 (amended). A pipe according to claim 1, [wherein (it  
f.i. includes)<sup>14</sup> an annular sealing gasket of an elastically  
compressible material interposed in elastic transverse<sup>23</sup>  
compression stress between said inside peripheral face and  
said outside peripheral face,<sup>12</sup> at least in the immediate  
vicinity of said front face.<sup>11</sup>

10 (amended). A pipe according to claim 9, wherein  
said outside peripheral face<sup>12</sup> presents a localized annular  
setback<sup>17</sup> at least in the immediate vicinity of said front  
face<sup>11</sup> and in that said gasket<sup>18</sup> is received over a fraction of  
its transverse dimension<sup>17</sup> in said setback.

11 (amended). A pipe according to claim 9, wherein said  
gasket<sup>18</sup> is in the form of a film.

12 (amended). A pipe according to claim 11, wherein  
said film<sup>18</sup> extends from said front face<sup>11</sup> over a longitudinal  
dimension shorter than the respective longitudinal<sup>12</sup>  
dimensions of said outside peripheral face and of inside  
peripheral face.<sup>23</sup>

13 (amended). A pipe according to claim 11, wherein  
said inside peripheral face<sup>23</sup> is fastened to said film<sup>18</sup> by  
annular adhesive<sup>53</sup> between them.

14 (amended). A pipe according to claim 11, wherein  
said film presents at least one continuous annular bulge  
spaced apart longitudinally from said front face by a  
distance which is shorter than the respective longitudinal  
dimensions of said outside peripheral face and said inside  
peripheral face causing an increase in said tension and in  
said pressure that is localized longitudinally.

15 (amended). A pipe according to claim 14, wherein  
said continuous annular bulge corresponds to a continuous  
annular groove in said inside peripheral face.

16 (amended). A pipe according to claim 1, wherein the  
inside of the ring presents longitudinal abutment means for  
engaging said front face, the abutment means being located  
at the transition between the ferrule and the skirt  
projecting transversely relative to said inside peripheral  
face and being placed facing said front face.

17 (amended). A pipe according to claim 16, wherein  
the skirt also presents a longitudinal inside peripheral  
face, and in that the abutment means also form a transverse  
projection relative thereto to serve as a longitudinal  
abutment for said male endpiece.

18 (amended). A pipe according to claim 17, wherein  
the abutment means comprise a transverse annulus that is

circumferentially continuous, and that presents a longitudinal dimension that is uniform.

19 (amended). A pipe according to claim 16, wherein said <sup>18</sup>film forms an annular rim extending transversely on said front face;

and in that the longitudinal abutment <sup>34</sup>means press longitudinally against said front face via said rim.

20 (amended). A pipe according to claim 1, wherein the inside of the skirt presents a shape suitable for receiving and holding at least one transverse annular sealing gasket <sup>62</sup> for engaging the male <sup>7</sup>endpiece.

21 (amended). A pipe according to claim 20, wherein the inside of the <sup>6</sup>skirt has at least one transverse annular sealing <sup>62</sup>gasket <sup>7</sup>fixed thereto for engaging the male endpiece.

22 (amended). A pipe according to claim 1, wherein the <sup>5</sup>ferrule has a transverse annular edge <sup>25</sup>longitudinally opposite from the transition between the ferrule and the skirt, and projecting transversely relative to said inside peripheral face in the immediate vicinity of said edge, at least one projecting catch engaged in a depression in the outside peripheral face to hold the ferrule longitudinally on the cylinder.

23 (amended). A pipe according to claim 22, wherein  
said depression is in the form of a transverse annular  
groove in said outside peripheral face.

24 (amended). A pipe according to claim 22, wherein  
the ferrule has a plurality of catches that are  
circumferentially localized, being regularly distributed  
circumferentially, all occupying the same longitudinal  
position and engaged in respective depressions or in said  
annular groove.

25 (amended). A pipe according to claim 1, wherein the  
ferrule is fastened to the cylinder by transverse pins that  
are regularly distributed circumferentially.

26 (amended). A female end ring for making a pipe  
according to claim 1, presenting a longitudinal axis and  
comprising:

- a longitudinal ferrule defined by a longitudinal  
inside peripheral face; and

- a longitudinal skirt situated axially in line with  
the ferrule,

the ferrule being elastically expandable  
circumferentially.

27 (amended). A female end ring according to claim 26,  
wherein said inside peripheral face presents at least one  
continuous annular portion in relief that is elastically



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receive and to hold at least one transverse annular sealing  
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gasket.

34 (amended). A female end ring according to claim 33,  
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wherein the inside of the skirt is integral with at least  
62  
one transverse annular sealing gasket.

35 (amended). A female end ring according to claim 26,  
5 25  
wherein the ferrule presents a transverse annular edge  
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longitudinally opposite from the transition between the  
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ferrule and the skirt, and projecting transversely relative  
23  
to said inside peripheral face in the immediate vicinity of  
25 69  
said edge at least one catch.

36 (amended). A female end ring according to claim 35,  
5 69  
wherein the ferrule has a plurality of catches which are  
circumferentially localized, which are regularly  
distributed circumferentially, and all of which occupy the  
same longitudinal position.

37 (amended). A female end ring according to claim 26,  
5 6  
wherein the ferrule and the skirt present respective shapes  
and transverse dimensions suitable for enabling a plurality  
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of rings to be nested releasably and coaxially by nesting  
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the ferrule of one with the skirt of another.

38 (amended). A method of manufacturing a pipe of the  
type comprising:



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3 - a concrete cylinder possessing at least one annular end of determined longitudinal axis, defined by a longitudinal outside peripheral face and by a transverse front face;

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- a female end ring coaxial with said end and secured thereto, the ring consisting in:

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- firstly a longitudinal ferrule for securing to the cylinder, the ferrule being defined by a longitudinal inside peripheral face fitting snugly against said outside peripheral face in the immediate vicinity of said front face; and

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- secondly a longitudinal skirt projecting longitudinally over said front face to engage coaxially on a male endpiece of another pipe,

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said method comprising an initial step of prefabricating the ring,

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a) prefabricating the cylinder independently of the ring, the ring being dimensioned in such a manner that, at a determined longitudinal distance from the transition between the ferrule and the skirt, and in the absence of the ring being expanded circumferentially, said inside peripheral face presents transverse dimensions that are smaller than those presented by said outside peripheral face at the same longitudinal distance from said front

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face, but sufficiently close thereto to be capable of being increased to said dimensions by putting the ferrule under circumferential elastic tension; and

b) engaging the ferrule coaxially on the annular end of the cylinder to a determined relative position in which said transition coincides longitudinally with said front face, and fastening the ferrule to the cylinder in said determined relative position by placing said ferrule in a state of circumferential elastic tension providing sealing relative to said outside peripheral face by said inside peripheral face applying thereto transverse pressure that is distributed circumferentially in continuous manner.

39 (amended). A method according to claim 38, wherein said circumferential elastic tension is such that said inside peripheral face is fastened at least in part to said outside peripheral face by the mutual friction effect that results from said transverse pressure.

40 (amended). A method according to claim 39, wherein said effect is reinforced by banding the ferrule in said determined relative position.

41 (amended). A method according to claim 38, wherein coaxial engagement of the ferrule on the annular end of the cylinder during step b) is facilitated by placing the ferrule in a state of circumferential expansion greater

than that which corresponds to said state of circumferential elastic tension, until said relative position has been reached, and

in that the ferrule is allowed to leave said state of circumferential expansion so as to allow said transverse pressure to be established once said relative position has been reached.

42 (amended). A method according to claim 41, wherein the ferrule is placed in said state of circumferential expansion by means selected from the group comprising mechanical means and thermal means.

43 (amended). A method according to claim 38, wherein, respectively during the initial step and during step a), the ring and the cylinder are prefabricated in such a manner that said outside peripheral face and/or said inside peripheral face flare relative to their respective longitudinal axes in a longitudinal direction going away respectively from said front face and from the transition between the ferrule and the skirt.

44 (amended). A method according to claim 43, wherein during step a) the cylinder is prefabricated in such a manner that said outside peripheral face flares more than does said inside peripheral face relative to their respective longitudinal axes.

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45 (amended). A method according to claim 38, wherein between steps a) and b), a ring of adhesive<sup>52</sup> is deposited on a localized zone of said outside peripheral face<sup>12</sup> and/or of said inside peripheral face<sup>23</sup> selected in such a manner that when implementing step b) and thereafter said zone constitutes a zone of mutual contact via said adhesive<sup>52</sup> and of application of said transverse pressure.

46 (amended). A method according to claim 38, wherein between steps a) and b), at least one continuous ring of plastic sealing material is placed on said outside peripheral face<sup>12</sup> and/or said inside peripheral face<sup>23</sup>, and in that during step b), said plastic sealing material between said inside peripheral face<sup>23</sup> and said outside peripheral face<sup>12</sup> is caused to be flattened and/or to creep.

47 (amended). A method according to claim 38, wherein between steps a) and b), a sealing gasket of elastically compressible material<sup>18</sup> is put into place on said outside peripheral face<sup>12</sup> at least in the immediate vicinity of said front face<sup>11</sup>,

and in that during step b), said gasket is put into elastic transverse compression stress between said inside peripheral face<sup>23</sup> and said outside peripheral face<sup>12</sup>.

48 (amended). A method according to claim 47, wherein, during step a), the cylinder is prefabricated in such a

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manner that said outside peripheral face presents a localized annular setback<sup>17</sup> at least in the immediate vicinity of said front face<sup>18</sup>, and in that between steps a) and b), said gasket is put into place by being received over a fraction of its transverse dimension in said setback<sup>17</sup>.

49 (amended). A method according to claim 47 wherein said gasket<sup>17</sup> is selected in such a manner that it is in the form of a film.

50 (amended). A method according to claim 49, wherein said film is selected and placed in such a manner that it extends from said front face<sup>18</sup> over a longitudinal dimension that is less than the longitudinal dimensions respectively of said outside peripheral face<sup>12</sup> and of said inside peripheral face<sup>23</sup>.

51 (amended). A method according to claim 49, wherein between steps a) and b), after said film has been put into place, a ring of adhesive<sup>53</sup> is deposited on a localized zone of said film and/or of said inside peripheral face<sup>23</sup> selected in such a manner that during implementation of step b) and subsequently, said zone<sup>53</sup> constitutes a zone of mutual contact via said adhesive and of application of said transverse pressure.

52 (amended). A method according to claim 45, wherein  
said adhesive is selected in such a manner that while in  
the fresh state it constitutes a lubricant associating  
implementation of step b) by progressive forced engagement  
of the ferrule coaxially onto the annular end of the  
cylinder, and subsequently serves to fasten them together.

53 (amended). A method according to claim 49, wherein  
said film is selected and placed in such a manner as to  
present at least one continuous annular bulge  
longitudinally spaced apart from said front face by a  
distance which is shorter than the respective longitudinal  
dimensions of said outside peripheral face and said inside  
peripheral face, so as to give rise to a longitudinally  
localized increase in said tension and in said pressure.

54 (amended). A method according to claim 53 wherein  
the hardness and the dimensions of said continuous annular  
bulge are selected and step b) is implemented in such a  
manner that in said determined relative position said  
continuous annular bulge causes a corresponding continuous  
annular groove to be formed in the inside peripheral face,  
by localized plastic deformation of the ferrule.

55 (amended). A method according to claim 38, wherein  
during step b) coaxial engagement of the ferrule on the  
annular end of the cylinder is stopped when the

longitudinal abutment means come into abutment against said front face.

56 (amended). A method according to claim 55 wherein between steps a) and b), an annular transverse rim of said film is formed on said front face, and

in that during step b), said coaxial engagement is stopped when the longitudinal abutment means come into abutment against said front face via said rim.

57 (amended). A method according to claim 38 wherein in step a) or after step b), at least one transverse annular sealing gasket for engaging the male endpiece is secured to the inside of the skirt.

58 (amended). A method according to claim 38, wherein during step a), the cylinder is prefabricated in such a manner as to present in said outside peripheral face at a longitudinal distance from said front face corresponding to the longitudinal distance between said catch and the transition between the ferrule and the skirt, at least one depression for receiving said catch, there being at least one such catch, and in that step b) is implemented by progressively engaging the ferrule by force coaxially on the annular end of the cylinder and by pressing said at least one catch on said outside peripheral face by increasing elastic deformation of the ring and by allowing

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